SteadyStat Case Studies
Synthetic Patient Scenarios for Clinical Evaluation

Overview

These synthetic patient scenarios demonstrate how SteadyStat organizes home blood pressure and medication adherence data to support clinical evaluation. Each case reflects patterns commonly encountered in hypertension management and illustrates how structured home data may relate to clinical reasoning.

These datasets are synthetic time series designed to mirror well-known clinical patterns such as diurnal variation, adherence-linked differences, and long-acting antihypertensive profiles. They are intended for educational demonstration only and are not medical advice or diagnostic tools.

SteadyStat is a patient-facing mobile app that generates structured, clinician-ready reports to support hypertension follow-up and treatment decisions. It is a clinical decision-support tool, not a diagnostic device. By presenting home BP readings alongside adherence and timing context, SteadyStat provides a clearer view of day-to-day patterns that may inform clinical conversations.

How to Use These Cases

Each case includes:

- a synthetic vitals log
- a medication list
- an adherence log

To explore the cases:

1. Import the dataset into SteadyStat.
2. Generate the standard SteadyStat report.
3. Compare:
    - adherent vs. non-adherent days
    - trough vs. peak windows
    - time-of-day averages
    - variability metrics

Use the guiding questions provided for each case to support interpretation.

Case Summary Table

Case	Primary Pattern	Medication Schedule
1	Higher morning trough with controlled peak window (high adherence)	Lisinopril 20 mg once daily (08:00)
2	Apparent resistance driven by clustered missed doses (pulse rebound)	Metoprolol succinate ER 50 mg once daily (08:00)
3	Diastolic controlled but systolic variability persists (ISH-like)	Amlodipine 5 mg once daily (08:00)
4	Multi-medication regimen with residual evening elevation (selective missed doses)	Losartan 50 mg (08:00) + HCTZ 12.5 mg (08:00) + Amlodipine 5 mg (20:00)

Report Interpretation Guide

Use this table as a quick reference for which SteadyStat report(s) to review first and what each case demonstrates.

Case	Reports to Prioritize	Primary Finding
1	Trough-to-peak, Daypart/time-window, Trend	Elevations cluster in pre-dose trough; controlled peak windows suggest timing effects rather than treatment failure
2	Adherence, Adherent vs non-adherent days, Pulse context, Variability	Apparent resistance explained by clustered missed doses; BP and pulse rise together on skipped days
3	Variability metrics, Trough-to-peak, Trend by daypart	Adherence excellent and exposure steady, but systolic variability persists—suggesting phenotype or class strategy
4	Adherence overlay by medication, Daypart/time-window, Trough-to-peak (AM vs PM), Variability	Residual evening elevation linked to selective missed nighttime dosing, not inadequate baseline therapy

Case 1: Higher Morning Trough, Controlled Peak Window

(High Adherence)

Medication: Lisinopril 20 mg PO once daily at 08:00; adherence ~95%

Clinical Pattern: Morning readings are higher (pre-dose trough). Midday readings (2–6h post-dose peak window) are well controlled. Evenings are mildly elevated.

What SteadyStat Shows

- Adherence report shows consistently taken doses with only occasional misses
- Trough-to-peak summary shows clear difference: higher trough vs lower peak (expected for once-daily dosing)
- Daypart/time-window views show that elevated readings concentrate in morning trough rather than across full day
- Trend over time shows modest early improvement and stable control during peak windows

Guiding Questions for Clinical Review

- Are elevated readings clustered in a specific window (trough) rather than uniform all day?
- On adherent days, does the peak window show control even if daily average looks borderline?
- Would dosing-time adjustment or split dosing be a more plausible next step than escalating dose?

Common Pitfalls Without Structured Data

- Single daily average can look uncontrolled even when medication effect is adequate at peak
- Ignoring time-from-dose can hide classic trough effect and lead to unnecessary escalation
- Over-weighting a few high morning readings can misrepresent daytime control

Case 2: Pseudo-Resistance Driven by Clustered Missed Doses

(Pulse Rebound)

Medication: Metoprolol succinate ER 50 mg PO once daily at 08:00; adherence ~60–70% with clustered misses

Clinical Pattern: Missed-dose clusters create higher BP and higher pulse on non-adherent days. When taken, both BP and pulse are lower.

What SteadyStat Shows

- Adherence report highlights clusters of missed doses (not just random misses)
- Adherent vs non-adherent day comparison shows meaningful gap in both BP and pulse (pulse rebound corroborates beta blocker non-adherence)
- Trough windows on missed days are particularly elevated; peak windows look better when doses taken
- Variability increases during weeks with more missed doses

Guiding Questions for Clinical Review

- Do BP and pulse rise together on non-adherent days (suggesting loss of beta blockade)?
- Are uncontrolled weeks the same weeks with missed-dose clusters?
- If non-adherent days are removed, does control look acceptable?

Common Pitfalls Without Structured Data

- Averages can suggest resistant hypertension when true driver is adherence
- Without pulse context, BP alone can be misinterpreted as pharmacologic failure
- Treating with additional meds without addressing adherence increases risk of hypotension on adherent days

Case 3: Diastolic Controlled but Systolic Variability Persists

(ISH-like)

Medication: Amlodipine 5 mg PO once daily at 08:00; adherence ~98%

Clinical Pattern: Diastolic pressure is generally controlled, but systolic readings remain higher and more variable (wider pulse pressure). Medication effect is steady with minimal trough-to-peak swing.

What SteadyStat Shows

- Adherence report shows near-perfect adherence, ruling out missed doses as main driver
- Trough-to-peak summary shows relatively flat profile (expected for long-acting CCB)
- Variability metrics flag persistent systolic spread even when diastolic looks stable
- Trend views show stable diastolic but fluctuating systolic with time-of-day differences

Guiding Questions for Clinical Review

- Is the remaining problem primarily systolic, with diastolic already controlled?
- Do variability metrics stay high even on adherent days?
- Does flat trough-to-peak profile suggest current drug is doing its job, but phenotype may need different strategy (e.g., class add-on)?

Common Pitfalls Without Structured Data

- Averages can mask large swings that matter clinically (variability)
- Focusing only on diastolic improvement can hide persistent systolic risk
- Assuming non-adherence because control is imperfect can be incorrect when adherence is excellent

Case 4: Multi-Medication Regimen with Residual Evening Elevation

(Selective Missed Doses)

Medication: Losartan 50 mg PO once daily at 08:00 + Hydrochlorothiazide 12.5 mg PO once daily at 08:00 + Amlodipine 5 mg PO once daily at 20:00; AM adherence high, PM adherence lower with clustered misses

Clinical Pattern: Morning combination therapy produces improved daytime control. Residual elevations concentrate in late day/evening window, most pronounced on days when 20:00 dose is skipped. Pulse relatively stable (no beta-blocker signal), supporting BP-specific timing/adherence interpretation.

What SteadyStat Shows

- Adherence views show clear pattern: AM medications mostly taken, PM dose has clusters of skips
- Daypart/time-window views show control during midday but recurring evening elevation pattern aligning with PM non-adherence
- Trough-to-peak interpretation helps separate: (a) AM trough/peak effects from (b) second, PM-dependent control window
- Variability metrics increase during weeks with more skipped PM doses, even when AM adherence remains high

Guiding Questions for Clinical Review

- Is remaining elevation time-locked (evening) rather than uniform throughout day?
- Do evening elevations co-occur with skipped PM doses even when AM meds are taken?
- If analysis restricted to fully adherent days (all meds taken), does overall control look acceptable?

Common Pitfalls Without Structured Data

- Single daily average can hide pattern where problem is confined to evening window
- Assuming pharmacologic failure and adding more therapy when driver is selective non-adherence increases complexity and risk
- Looking only at one medication's adherence can miss regimen-level exposure gaps (the "weak link" dose determines control)

Appendix: How to Read SteadyStat Reports

SteadyStat reports are organized to match clinician reasoning: behavior first (adherence), then pharmacologic timing (peak/trough), then stability (variability) and trends over time. A practical workflow:

1. Start with adherence. Look for clusters, missed-dose streaks, or selective non-adherence (e.g., PM dose misses)
2. Check time windows (daypart and trough-to-peak). Ask: are high readings concentrated in a predictable window (pre-dose trough, evening, etc.)?
3. Compare adherent vs non-adherent days. If control is acceptable on adherent days, escalation may be inappropriate without addressing adherence
4. Review variability metrics. Averages can look fine while variability remains clinically meaningful—especially for systolic pressure
5. Use pulse as context when relevant. Pulse changes can corroborate beta-blocker exposure or missed doses; stable pulse can help rule out certain patterns

Key principle: If the interpretation changes when you segment by time-from-dose or adherence, the average was hiding the real signal.